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THESIS

RATE STABILIZATION AND ITS IMPACT
ON U. S. NAVAL SHIPYARDS

by

Melville Joseph Walters, III

September, 1979

Thesis Advisor: Robert B. Cunningham

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Rate Stabilization and Its Impact
On U. S. Naval Shipyards

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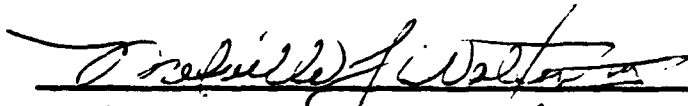
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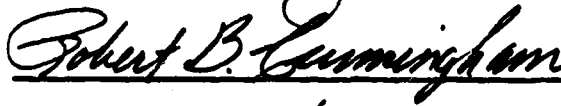
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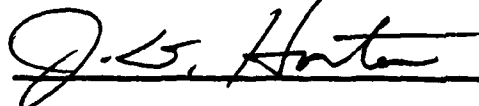
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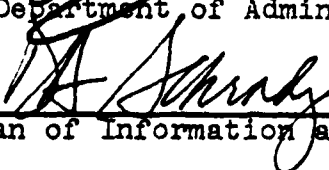
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ABSTRACT

The eight United States Naval Shipyards commenced operation under the rate stabilization concept in 1976. Rate stabilization refers to the use of annually predetermined rates for the billing of customers for work accomplished in the shipyard. A primary objective of rate stabilization was to provide improved planning and budgeting to the customer and the shipyard.

The objective of this thesis was to assess the impact of rate stabilization on the U. S. Naval Shipyards.

Conclusions are that the overall operational, planning and programming advantages provided by rate stabilization more than offset the disadvantages. Indications are that the concept of rate stabilization is working and that the shipyards are learning to work within the program. It is important that, once stabilized rates have been set, major changes in workload at the individual shipyards do not occur.

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I. RESEARCH OBJECTIVE

A. INTRODUCTION

United States Naval Shipyards exist to provide support in the form of overhauls, repairs, alterations and modernizations to the operating fleet. In this capacity, they operate as big business with the eight naval shipyards achieving gross sales of \$1.8 billion in Fiscal Year 1977. This represents approximately five percent of the Navy budget for that year, a figure comparable to previous years and truly a significant amount.

This thesis addresses itself to the impact of stabilized rates on operations at the U. S. Naval Shipyards. Rate stabilization refers to the use of predetermined rates for the billing of customers for work accomplished in the shipyard. The rates are established on an annual basis and, once approved, can be changed only with great difficulty at the Department of Defense level. This is a significant change from past operations where the rates used to charge customers could be, and frequently were, adjusted periodically during the year. It is important to note that these rates are established as much as eighteen months prior to the time that they actually become effective and thus require a considerable amount of planning and forecasting. Naval shipyards have been operating with stabilized rates for several years now, thus affording the opportunity to evaluate the effect of the revised operations.

B. THESIS OBJECTIVE

The objective of this thesis is to assess the impact of rate stabilization on U. S. Naval Shipyards. In order to accomplish this objective, the following specific areas were researched:

1. A review of the Navy Industrial Fund at the naval shipyards and a determination as to why the use of stabilized rates became a necessity.

2. A determination of how the policy of stabilized rates is presently operating in the shipyards.

3. An analysis of the impact of rate stabilization on the operation of the shipyards.

C. APPROACH

The approach used in this thesis included a review of current articles, books and government documents pertaining to the Navy Industrial Fund and rate stabilization; an extensive personal interview with the Controller at the Mare Island Naval Shipyard; and telephone interviews with personnel at other Naval Shipyards, at the Navy Comptroller's Office, Washington, D. C., and at the Naval Sea Systems Command, Washington, D. C.

II. BACKGROUND

A. INTRODUCTION

To gain an understanding of the impact of rate stabilization on the shipyards, one must first obtain an understanding of the environment in which this procedure has been implemented. A

brief look at the Navy Industrial Fund and at rate stabilization, itself, is therefore in order.

B. THE NAVY INDUSTRIAL FUND (NIF)

The Navy Industrial Fund is one of several industrial funds operating within the Department of Defense. It was established with the intent of improving management capability over the large amount of resources involved in the operation of the shipyards. The Navy Industrial Fund, authorized under the provisions of 10 U. S. Code 2208, provides a means of financing work to be accomplished through a revolving fund. The fund is then replenished by the customer upon completion of the job (Ref. 1). The goal of the fund is to recover all costs without generating a profit or incurring a loss and to reduce the impact of the annual appropriations cycle on the shipyard operation.

Guidance in the operation of the NIF at naval shipyards is provided by several sources; among them the Navy Comptroller Manual, Vol. 3 (Ref. 2), The Navy Industrial Fund Handbook for Naval Shipyards (Ref. 3), The Navy Industrial Fund Financial Management Guide (Ref. 4), and DOD Instruction 7410.4, "Regulations Governing Industrial Fund Operation" (Ref. 5).

DOD Instruction 7410.4 delineates the following objectives for industrial funds:

1. Provide a more effective means for controlling the costs of goods and services required to be produced or furnished by industrial and commercial type activities, and a more effective and flexible means for financing, budgeting and accounting for the costs thereof;

2. Create and recognize contractual relationships between industrial and commercial-type activities and those activities which budget for and order the end-product or services in order to provide management advantages and incentives for efficiency and economy;
3. Provide to managers of commercial and industrial type activities the financial authority and flexibility required to procure and use manpower, materials and other resources effectively;
4. Encouraging cross-servicing among the military departments and among their operating agencies, with the aim of obtaining more economical use of facilities;
5. Support the performance budgeting concept by facilitating budgeting and reporting for the costs of end products, and thus underlining the cost consequences of decision making, including choices between alternatives in such terms. (Ref. 5)

The first, third and fifth objectives above are particularly germane to this thesis.

Navy Industrial Fund operation at the naval shipyards is, indeed, big business. At the end of Fiscal Year '78, the annual sales of the eight shipyards amounted to \$1,984,897,000, sufficient to rank in the top two hundred firms of private industry. Table 1 provides a listing of the naval shipyards with their annual sales and employment figures. Of the work performed in the shipyards, approximately 85% involves the overhaul, repair and modernization of ships. The remaining 15% consists of repairs and manufacturing of parts for the Navy Ships Parts Control Center and work accomplished for tenant activities and other customers (Ref. 6). One has only to look at the number of employees involved and the volume of dollars passing through the shipyards to realize the significance of the operations being conducted there.

TABLE 1
Gross Business/Employment of the Naval
Shipyards in FY '78 (\$000) (Ref. 6)

<u>SHIPYARD</u>	<u>GROSS BUSINESS</u>	<u>EMPLOYMENT</u>
Norfolk	\$ 308,696	11,306
Mare Island	299,674	9,500
Puget Sound	297,384	10,500
Long Beach	239,121	7,304
Philadelphia	233,202	7,970
Charleston	219,424	7,680
Pearl Harbor	195,359	6,127
Portsmouth	192,037	7,475
TOTAL	\$ 1,984,897	67,862

At this point in the study, it seems appropriate to cover, in not great detail, the operation of the NIF at the shipyard. The following paragraphs will describe the operation of the NIF as well as some of the procedures and systems utilized.

1. Operation

Each shipyard conducts its operations through the use of a revolving fund, referred to as the "corpus". Operating expenses generated during the performance of the assigned work are paid for out of the corpus. Upon completion of the work, the customer is billed and the corpus reimbursed. Alternately, progress payments may be utilized to restore the corpus while work is in progress.

The basis upon which work is performed in the shipyard is normally a project order which describes the work in detail. The rates to be applied to the work are the stabilized rates, stabilized in that they are established prior to, and remain in effect throughout, the fiscal year. In the case of the shipyard, the approved stabilized rates will be used to bill overhaul, repair and alteration starts throughout the entire period of the order, regardless of the number of fiscal years involved (Ref. 7).

2. Billing and Collection

There are three methods by which customers may be billed: (1) fixed price, (2) cost-reimbursable and (3) pre-determined rates (Ref. 8). The last are, quite simply, rates established to cover such things as utilities, transportation, etc.

The shipyard has two options available to it within the fixed-price method. It can offer a fixed rate to the customer prior to commencing any of the projected work or it can offer a fixed rate to the customer at any time before 50% of the work is completed. Obviously, the shipyard must have a very accurate projection of the work requirements prior to making a fixed-price offer. The amount of the fixed-price offer, however, must be determined utilizing the stabilized rates which the yard has published (Ref. 7). Irregardless of actual costs, once a fixed-price contract has been agreed upon, that is the only amount which the shipyard can bill the customer. If a fixed-price contract can be reached, this provides a significant benefit to the customer from the standpoint of planning the overhaul. Likewise, it can work to the advantage, or disadvantage, of the shipyard depending on their efficiency in completing the contract. Any changes to the overhaul package must be negotiated into the contract prior to acceptance.

The cost-reimbursable method will be utilized when the project order does not sufficiently define the work requirements or if the customer feels that the fixed price offer is too high. In this situation, the customer is billed for the costs incurred by the shipyard utilizing the established stabilized rates plus the cost of material used.

Billing is accomplished on a DD Form 1080 which is submitted to the nearest Navy Regional Finance Center. The DD 1080 becomes a voucher which the Navy Regional Finance Center

utilizes to debit the shipyard NIF corpus and credit the customer's appropriation.

3. Accounting

NIF activities utilize a cost accounting system with cost centers and job orders being the key elements in the system. Each cost center has three important characteristics:

a. Each cost center consists of a natural grouping of men, machines, methods, processes, operations;

b. Each cost center is made up of elements having common cost characteristics;

c. Each cost center has a single manager to whom is assigned total responsibility and accountability (Ref. 9).

The use of cost centers is logical in the industrial environment and provides for the accumulation of controllable costs.

Each and every order received at the shipyard is assigned a unique job order number. All work accomplished on that order is then charged to the job order number to provide for accumulation of costs and eventual customer billing.

There are three types of job order costs collected under the NIF: (a) direct costs, (b) production overhead costs, and (c) general and administrative costs (Ref. 8).

Direct costs are "those elements of productive costs which can be identified without undue effort to specific job orders assigned to accomplish a project, task, product or service for customers, or to a process under a process cost

system" (Ref. 2). Direct costs, which may include labor, labor acceleration, material, etc., are charged directly to the job order.

Production overhead costs are those costs generated by a cost center which cannot be charged directly to a job order but which are incurred in support of the cost center. The most common form of production overhead cost is that associated with supervision. The application of the overhead cost to the job order is done on the basis of a predetermined overhead rate within each cost center.

General and administrative overhead costs are those incurred in support of the activity as a whole. Falling into this category may be the costs of management, planning departments, civilian personnel offices, etc. These costs are distributed at a rate based on the output of the entire activity, generally per man-hour or man-day.

Accurate and reliable cost accounting is fundamental to the proper operation of the shipyard because of the NIF requirement to operate without a profit or loss. Without a reasonable determination of costs involved in performing the required work the shipyard could not hope, or expect, to meet this requirement.

There are several other costs associated with the operation of the shipyard which must be accounted for but which are not properly charged to its customers. Included are the following:

a. Unutilized and Underutilized Capacity. The NAVCOMPT Manual provides that such costs will not be charged, via overhead, to customers but should be budgeted for and funded as a mobilization and reserve item (Ref. 2). In practice, this is not done. The naval shipyards maintain excess capacity because they were built for wartime service. It is difficult to separate, identify and quantify the costs associated with this excess capacity and, in fact, funding to support this capacity does not receive separate budgeting. The end result is that some costs are passed to the customer.

b. Military Personnel. NIF customers do not pay for military salaries, as these are paid for by the military personnel appropriations.

c. Depreciation. Although depreciation costs are determined on the plant and equipment, they are not passed on to NIF customers.

d. Disability Compensation Expense. This expense is paid by the Department of Labor.

e. Rental of Building and Space. The costs of rental from another activity or agency is not to be paid by the NIF customer.

f. Capital Investments. Any capital investment (greater than \$1,000) must be purchased with appropriated funds designated for that purpose.

4. Financial Reporting

Quarterly, the following documents are submitted to the activity group manager which is, in the case of the naval shipyards, Commander, Naval Sea Systems Command (SEA 017):

- a. A Statement of Financial Condition - a balance sheet displaying assets, liabilities and fund capital.
- b. Statement of Revenue and Cost - an income statement which provides net operating results and other statistics such as unfunded costs, personnel strengths and operating costs.
- c. Detailed Supporting Exhibits - including summaries of costs, revenues, expenses, shipwork in progress, etc.

5. Financial Analysis

The data contained in the statement of financial condition and the statement of revenue and cost may be analyzed in a similar manner to the statements issued by any private business. There are, however, three important elements of analysis which deserve discussion in the case of the shipyard:

a. Fixed Price Variance (FPV)

This variance is predicated on the fact that the customer has accepted a fixed price contract. Since the fixed price is simply the stabilized rate times the estimated mandays of labor, the only element which the yard can vary is the required mandays (M/D). The fixed price variance then becomes:

$$FPV = (FP \ M/D - Actual \ M/D) \times (Stabilized \ Rate)$$

b. Billing Variance (BV)

The billing variance arises because of differences between actual rates and stabilized rates:

$$BV = (\text{Actual M/D}) \times (\text{Stabilized Rate} - \text{Actual Rate})$$

c. Gain/(Loss) From Operations (G/L)

The gain or loss arises because a difference will exist between the applied overhead rates and the actual overhead rates:

$$G/L = (\text{Actual M/D}) \times (\text{Applied O/H Rate} - \text{Actual O/H Rate})$$

Given that the NIF activity objective is to attain a zero gain/loss, the above equations indicate the critical nature of the forecasting used in estimating manday rates and mandays of labor required.

C. RATE STABILIZATION

"In FY 1977...we have budgeted for 105 ship overhauls, but, because we are unable to budget for inflation, we are estimating that we will be able to accomplish only 90 overhauls." -- Secretary of the Navy, J. William Middendorf before the House Appropriations Committee, Defense Subcommittee, February 10, 1976 (Ref. 6).

The statement above rather plainly displays the problems being encountered in shipyard planning in the late sixties to early seventies. Prior to 1976, and the implementation of rate stabilization, shipyards were permitted to adjust their rates on a quarterly basis to account for cost increases. Since the customer had to budget his overhaul as much as two years before entering the shipyard, these cost increases simply translated into program reductions or requests to Congress for additional

funds, a painful process. What then were the causes behind the changes in the shipyard rate schedules?

First, and foremost, of course was the rapidly increasing inflation rate during this period. An industrial activity, such as the shipyard, felt the effects of inflation rather sharply in increased utility rates and material costs. Given the requirement to attain a zero profit/loss condition by the end of the year, the shipyard commander would simply adjust his rate schedule as needed throughout the year to meet this requirement.

The second major problem involved labor costs, which account for approximately 50% of the costs incurred by the shipyard. The shipyard commander has no direct control over wage rates paid to his employees as they are set outside the realm of his command. In addition, he was not allowed to budget for anticipated pay raises. In order to achieve a zero profit/loss condition, the shipyard had to adjust their rates with changes in the labor rates.

A third problem, which did not receive as much attention prior to rate stabilization, was that of inefficiency within the shipyard itself. Because their rates could be periodically adjusted, efficiency, while of some concern, was not given top attention. As a result, problems within the workforce and scheduling system contributed to the increasing costs.

The three problems discussed above were major contributors to this sensitive issue. Without a doubt, there were others. The summation of all these factors, however, spelled a major

problem for the Navy. During the period FY 1971 through FY 1976, 672 overhauls were scheduled. Only 561, or 83.5% were actually accomplished (Ref. 6). The net effect of this situation was a large number of ships, in a decreasing fleet, in reduced material condition.

Rate stabilization was implemented at all NIF activities during Fiscal Years 1976 and 1977. It has continued to operate as planned with only minor changes to date. Given that rate stabilization is here to stay, at least for the foreseeable future, what are the advantages and disadvantages of such a program?

1. Advantages

The first, and most important, advantage derived from rate stabilization is the improved planning and budgeting now available to the customer. Once a fixed price has been agreed upon, the customer does not have to make any changes to his planned program as the NIF corpus absorbs all price variations. We've already seen that in the years prior to rate stabilization only 83.5% of the scheduled overhauls were actually accomplished. In FY 1977, the first year after rate stabilization, ninety overhauls were scheduled and ninety were completed (Ref. 6). Not only does this effort improve fleet operational readiness, it goes a long way toward easing the Navy's tarnished image before Congress.

Of prime interest, to both the customers and the NIF activities, is the reduced workload which should accompany the new procedures. Because there are no rate changes during the

year, the required paperwork to keep the system in operation should be reduced. In addition, requests for readjusting of budgets should be all but eliminated.

2. Disadvantages

The loss of management flexibility in the shipyard is probably the greatest disadvantage brought about by rate stabilization. The original idea of the individual command controlling its finances in such a manner as to achieve zero profit/loss has all but been lost. This flexibility accompanied the command prerogative of quarterly adjusted rates to compensate for rising costs. The shipyard now must meet its objective with the only flexible tool remaining, that of manipulation of its overhead functions.

A second, and difficult problem inherent in the new program is the long-term planning required of the shipyard managers. They now must estimate the effects of inflation, utility and fuel increases, and pay raises as much as two years into the future. Certainly that cannot be expected to be extremely accurate, and this could result in large rate variations between fiscal years.

Finally, the three year cycle established for rate stabilization in the shipyards will tend to destroy some of the management incentives previously existing. Actions taken by the commanding officer may not be fully implemented or evaluated during his tour of duty and will be passed on to the next commanding officer. In a similar vein, evaluation of the command must be looked at in a different light.

Previously, a key point of evaluation was how close to the zero profit/loss objective that the command came. Since the command may now have to incur a loss in one year to offset a profit in the previous year, this method of evaluation has been eliminated. In addition, the psychological aspects of intentionally operating at a loss may have some impact on the management of the shipyard.

Now that we have looked at rate stabilization and its advantages and disadvantages, let us turn to the operational factors involved with the program. In order to determine the stabilized rate for any given fiscal year, the steps below are followed:

a. The workload and schedule of the workload is determined in cooperation with the customer.

b. The workload, determined above, is matched to the workforce to determine the number of direct labor mandays to be spent on each overhaul.

c. Costs to be involved are then determined:

(1) The direct labor cost is a function of the existing wage scales and pay raise guidance provided.

(2) Material costs are those anticipated for the overhauls inflated in accordance with guidance provided.

(3) The overhead costs are based on the demonstrated needs of the command.

d. The three costs above are summed and then divided by the number of direct labor mandays determined in step two. This calculation provides the stabilized rate per manday.

The stabilized rate for an overhaul which lasts beyond one fiscal year is calculated in a similar manner. The costs are determined as above for each fiscal period involved and then weighted in accordance with the mandays to be worked during that period to arrive at a final rate. This rate then applies throughout the entire overhaul period (Ref. 6).

As we have seen already, the stabilized rate is then utilized in each individual overhaul to determine the fixed price which will be offered to the customer. Alternatively, it is the stabilized rate which is used to calculate the billing on a daily basis in the cost-reimbursable method.

One additional factor must be taken into consideration to determine the final published stabilized rate. It is almost a certainty that an activity cannot achieve a zero gain/loss in operating results. To compensate for this factor, and to attempt to bring net operating results back to zero, a payback factor is applied. Past gain or loss amounts are divided by the estimated mandays for the new year. This provides a positive or negative payback factor which is applied to the stabilized rates determined earlier. The intent of this procedure is to try to dampen the oscillations which can occur from year to year. This subject will be discussed in greater detail in the next chapter.

III. ANALYSIS OF IMPACT

A. INTRODUCTION

In Chapter II, the history, size and operation of the Navy Industrial Fund were reviewed, particularly with relation to the eight U. S. Naval Shipyards. Rate stabilization was then studied, including its creation and history, a discussion of the advantages and disadvantages of the program, and its operation within the shipyards.

The next step, and the main objective of this research, is to assess the impact of rate stabilization on the shipyards. Since the program has only been in operation for a few years, the effects of its inception are not always clear and those who comment on its effects are not unanimous in their comment. The following paragraphs will describe the impact of rate stabilization, first from the positive side and then from the negative side.

B. POSITIVE IMPACT

1. Fleet Readiness

There are several aspects of rate stabilization which can be viewed as having a positive impact on the Navy as a whole, on the shipyard customers or on the shipyard itself. The most important of these, which has already been discussed, is the improved fleet readiness brought about by this program. The Navy can now plan and budget several years into the future knowing that the overhauls planned will be accomplished if funds are appropriated by the Congress. This allows Fleet

Commanders to plan on not only known force levels, but also material condition of the operating ships. RADM Travers commented on this aspect when he said,

"It permits the customer to achieve his budgeted program which was developed in large measure based upon certain operational commitments levied on him by national authorities" (Ref. 10).

The importance of improved fleet readiness cannot be overemphasized during this period when the number of active ships is at its lowest level in many years. The improvement of the Navy's ability to schedule and complete overhauls was a prime mover behind the rate stabilization program and its impact from this point of view seems to be extremely positive.

2. Stable Workload

Prior to the implementation of rate stabilization, naval shipyards increased their prices as the cost of operating the shipyard increased. The price increases resulted in the customer reducing his program because of his fixed level of funding. The reduced customer program reduced the shipyard workload which again caused unit prices to increase. The effect on the customer, only eighty-three percent of the scheduled overhauls completed, was of major importance to him (Ref. 6). The negative impact on the shipyard was also dramatic in that it resulted in an unstable workload and fluctuating workforce. Rate stabilization, and the vastly improved programming which accompanies it, has turned the negative impact into a positive one. Knowing that his costs are set once the workorder has been accepted, the customer

plans and executes his desired program with little or no change. The shipyard, knowing with reasonable certainty its future level of operations, is able to operate with a stable workforce. The importance of this factor to the shipyard management is dramatic. It permits adequate training programs, improved maintenance, and, most importantly, improved morale within the workforce.

3. Congressional Image

The combined effect of the above two changes provides an additional benefit to the Navy as a whole. The image which the Navy presents to the Congress has been vastly improved. We no longer have to report incomplete programs which require additional funding to bring to a conclusion. The Navy can now show the Congress that the programs which are planned, and which they have authorized, are being properly executed in a timely manner. We can also show the effects of the improved fleet readiness. The Congress can see that the Fleet Commanders are able to carry out their assigned responsibilities, execute training programs as needed, and have operable ships at their command. In short, the Navy can now support itself with respect to the overhaul programs.

4. Planning and Programming

The impact of rate stabilization upon planning and programming can be looked at from two different viewpoints. From the point of view of the shipyard customers, rate stabilization eliminates many problems which plagued them in the past and allows them to plan their overhauls with reasonable

expectancy of accomplishment. The rates which they will pay will remain constant from the start to the finish of the overhaul and estimates of cost growths will not be required.

From the point of view of the shipyards, the planning function remains much as it had been in the past. The anticipated workload is provided by the customers and the shipyard plans its use of resources to meet the customer's requirements (Ref. 13). If any change has occurred within the shipyards, it's that they should now have improved planning and programming given the known level of customer work.

There is one important difference in the method of planning now, however, that did not exist previously. One of the objectives of the rate stabilization program was to allow the Navy to achieve the budgeted program in the customer accounts by the elimination of the many cost increases in budgeted programs (Ref. 11). To accomplish this objective, it is necessary to budget for cost escalation, a practice not permitted in annual accounts. The customer can, however, budget based on industrial fund rates which are allowed to include anticipated cost escalation. This practice permits the customer to plan his program based on realistic costs which will not change on him during the period.

A very important aspect of the planning function for the shipyards is their reliance on outside sources of information. The stabilized rates are established based on a projected workload for a given year. If that workload changes after the stabilized rates have been published, the shipyard

is in a position whereby they cannot possibly achieve a zero accumulated operating result for that year (Ref. 13). For instance, in Fiscal Year 1978, two submarine overhauls were withdrawn from Mare Island Naval Shipyard after the rates were already in effect. No additional work was provided to compensate for the change and, as a result, Mare Island generated a sizeable operating loss. The opposite effect was seen at Norfolk and Charleston Naval Shipyards where a considerable amount of extra work was provided and a healthy profit was generated. It is critical to the shipyards, if they are to attain a zero accumulated operating result, that the workload provided to them for establishing their rates not be changed or, if it is, that they be compensated for it with additional work or cash. The major problem occurs when work is withdrawn, yet the shipyard must continue to support the workforce in place that was planned for the higher workload level. A cash balance problem, caused by a lack of payments received, is a definite possibility in this situation.

5. Improved Financial Management

Prior to implementation of rate stabilization, the ASD(C) anticipated that rate stabilization would work to improve financial management at the industrial fund activities (Ref. 17). He viewed it as an additional tool which management could use to more effectively operate the activities. In fact, this has probably occurred in some form, but is difficult to show. The variances associated with rate stabilization, which were discussed in an earlier chapter, are simply a few of the

many indicators which the financial manager must recognize. There are numerous types of variances and the effective manager must be able to isolate the factors associated with each (Ref. 15).

Rate stabilization has provided one very positive benefit in the financial management area. With the more stable financial plan inherent in the operation of the program, the measurement of budget execution throughout the year is simplified. It is easier to see where the dollars are going and evaluate the use of resources against the planned program. Since the estimated rate has now become the rate used for billing, the evaluation of labor productivity is direct.

The effect on the cost controls utilized in the shipyard has been negligible as a result of rate stabilization. The cost control systems, as such, are unchanged and a cost reimbursement system continues in use. It is now necessary, however, for the shipyard to maintain two sets of records, one for costs under stabilized rates and one for actual costs (Ref. 16).

Of importance to the financial management of the shipyard is the efficiency of operation of the yard. With regard to whether rate stabilization has worked to improve shipyard efficiency, it appears to be not necessarily so. In many respects, the rate stabilization program effects only the controller. Production personnel are not mindful of the accounting systems and efforts to improve their efficiency would have to be made with, or without, rate stabilization. A major

problem which dramatically effects the control of efficiency is that so many of the factors are outside of the control of the shipyard commander, i.e., workload, payscales, etc.

C. NEGATIVE IMPACT

1. Group Payback Factor

The single greatest criticism of rate stabilization, at least from the shipyard viewpoint, is the application of the payback factor on a group activity basis vice an individual activity basis. The payback factor, an amount charged each manday to attempt to bring the Accumulated Operating Results back to a zero value, is a necessity in order to accomplish the objectives of the Navy Industrial Fund. The shipyard would prefer individual payback factors so that each yard could individually control its own operating results. In fact, the payback factor is determined and applied activity-wide, that is, across all eight shipyards combined. We will look at the reasons for this mode of operation shortly.

Before looking at the impact of the group payback factor, a quick review of its computation would be helpful. The Accumulated Operating Results, for each shipyard or for the program as a whole, are divided by the direct labor mandays in the next year's program to produce a positive or negative factor. This factor is added to, or subtracted from, the stabilized rates to arrive at the rate which will actually be charged to the customer.

Table II presents the payback factors arrived at for Fiscal Year 1977 operating results. This payback factor is applied to the Fiscal Year 1978 shipyard overhaul program. Table III provides similar information for Fiscal Year 1978 operations applied to the Fiscal Year 1979 shipyard program. It is important to note, in the latter case, that the payback factors were determined and frozen thirteen months prior to the start of Fiscal Year 1979 (Ref. 6). Also very important to note is that a ship entering a yard keeps the same rate throughout the entire yard period, even if that period is greater than one year.

The individual factor column provides the amount which each shipyard would have to charge per manday to return to a zero operating result for the year under consideration. The wide range of factors calculated provides some indication of why dissatisfaction exists with the group payback factor. Shipyard H, in order to recover, must charge \$7.92 per manday. Utilizing the group payback factor, this yard has to reduce its rates by \$4.88 and, thus, only obtains a payback factor of \$3.04. It is a difficult situation for the shipyard commander when he has to start the year knowing full well that his yard will, in all likelihood, lose money for the year.

Tables II and III also point out a reason why the group payback factor is utilized and applied to the shipyards. For essentially the same type of service, without rate stabilization, a customer in shipyard H would pay approximately \$38

TABLE II
 PAYBACK FACTOR CALCULATION FOR APPLICATION
 TO THE FISCAL YEAR 1978 SHIPYARD OVERHAUL PROGRAM (Ref. 6)
 (IN DOLLARS-NEGATIVE IN PARENTHESES)

<u>SHIPYARD</u>	<u>INDIVIDUAL FACTOR</u>	<u>GROUP FACTOR</u>
A	(11.36)	(1.76)
B	(5.96)	(1.76)
C	.16	(1.76)
D	(2.32)	(1.76)
E	(.96)	(1.76)
F	(1.68)	(1.76)
G	(1.44)	(1.76)
H	7.92	(1.76)

TABLE III
 PAYBACK FACTOR CALCULATION FOR APPLICATION
 TO THE FISCAL YEAR 1979 SHIPYARD OVERHAUL PROGRAM (Ref. 6)
 (IN DOLLARS-NEGATIVE IN PARENTHESES)

<u>SHIPYARD</u>	<u>INDIVIDUAL FACTOR</u>	<u>GROUP FACTOR</u>
A	(30.12)	(4.88)
B	(17.55)	(4.88)
C	(6.23)	(4.88)
D	(5.65)	(4.88)
E	.67	(4.88)
F	1.92	(4.88)
G	6.54	(4.88)
H	7.92	(4.88)

per manday more for his overhaul than a customer in shipyard A. Given that an overhaul generally lasts a year or more and involves a tremendous number of mandays, the differences between the two shipyards could involve a significant sum of money. It could also generate a considerable amount of dissatisfaction from customers who are supporting overhauls in several shipyards simultaneously.

The factors described in the paragraphs above provide an indication of why the shipyards have such a negative view of the group payback factor. The shipyard commander has been directed, under the NIF system, to perform in such a manner that his accumulated operating results closely approximate zero. Now, he must face the fact that the performance of all the other shipyards affects his financial condition as much, and possibly more, than the performance of his own shipyard. He is placed in a position where he cannot entirely manage his own affairs and is not at all likely to see the breakeven point in operating results (Ref. 15).

Why is the group payback factor being used instead of the individual payback factor? There appear to be two reasons. First, the Department of Defense must maintain a proper image with this program before Congress. It is much simpler to justify requirements and defend the program while doing it for the program as a whole. By combining all individual operating results into the group operating result there is a tendency for the values to average out and show less change than if each

shipyard was individually presented (Ref. 13). In addition, one objective of the Navy Industrial Fund is to keep the fund solvent. At this level the big picture is more important than the individual activities and carries more weight (Ref. 18).

A second reason for the group approach is an attempt to keep down fluctuations from year to year (Ref. 18). Applying the group payback factor has a damping effect on the individual activities. It is hoped that this procedure will help to keep estimated costs close to actual costs and provide a more steady state rate structure.

2. Loss of Flexibility

There is a significant problem inherent in the concept of rate stabilization. In chapter II, we saw that one of the objectives of industrial funds was to provide industrial activities the financial authority and flexibility to utilize their resources in an effective manner. Rate stabilization, with its set rates, removes a large amount of that flexibility. The shipyard commander can no longer make adjustments during the year to minimize his profit or loss as is one of his goals under the industrial fund concept. In order to have some control over his financial position, the commander must now manipulate maintenance, training, and other functions internal to the shipyard, a practice not utilized in the past.

Another aspect of the reduced flexibility to which we have already alluded, is the problem which occurs when major requirements change after the rates have already been established. Unless the yard is compensated in some manner for

the change, a gain or loss will occur. Prior to rate stabilization, the shipyard commander could make the required compensation via his rate structure and move toward his zero operating result goal. Today, he cannot make that adjustment and must look beyond his command to obtain assistance.

3. Loss of Initiative

It is very difficult to say what the motivational impact of the program has been. There can be no doubt, however, that shipyard commanders and controllers see some loss of individuality and initiative with the advent of rate stabilization. After years of working toward a zero accumulated operating result, it is extremely difficult to reorient oneself and accept that the goal for any particular year may not be to break even. The longer timeframes involved also make it a distinct possibility that the shipyard commander may never see the results of his efforts.

4. Workload

In chapter II, we discussed the steps, in a simplified form, which are required to establish the rates that the shipyard will charge. Prior to rate stabilization, the rates were recomputed up to three times each year, a relatively lengthy process. The changing of rates during the year also complicated the billing and reporting procedures followed by the shipyard. Elimination of the multiple rate changes during the fiscal year was expected to reduce the administrative workload required of the shipyard. This has not necessarily been the

case, however. The costing system within the shipyard has not changed. What has changed is the additional paperwork required to maintain the new program. Additional schedules must be budgeted, rates must be published, and, in general, there is more correspondence involved with the administration of the program at the shipyard level (Ref. 16). It is difficult to determine whether there has been a change in workload compared to the pre-rate stabilization period because the required effort is now in a different form.

IV. CONCLUSION

A. INTRODUCTION

This paper addressed itself to the impact which stabilized rates have had upon U. S. Naval Shipyards. In order to reach that objective, three major areas were discussed; (1) the Navy Industrial Fund and its operation at the naval shipyards, (2) the present policy of stabilized rates at the shipyards and (3) an analysis of the impact of rate stabilization on the operation of the shipyards.

Prior to reaching any conclusions, it is important to note that this program has been in operation for only three years. Like any major new program, it met with considerable resistance upon its introduction. The naval shipyards, and the Navy in general, are still learning and growing with the program and it may be several years before its true impact can be understood. Close scrutiny of the program and periodic research as to its effectiveness are a necessity.

B. CONCLUSIONS

The following conclusions were reached as a result of research conducted in conjunction with this paper:

1. Rate stabilization at naval shipyards is a beneficial, and viable, program for the Navy. Although it has some negative aspects for the individual shipyards, the tremendous overall operational, planning, and programming advantages that it provides more than offset the disadvantages.

2. Rate stabilization is a program which is here to stay for the foreseeable future. All indications are that it is accomplishing its objectives.

3. Shipyard commanders and controllers are learning to work with rate stabilization and the group payback factor. Every effort must be made to continue to reorient the thought processes involved from that of maximizing the individual activity performance to that of maximizing the group performance.

4. Increased co-ordination among all activities involved is required to ensure that, once workloads have been established and the stabilized rates set, major changes in workload at individual yards do not occur. If the requirement does arise to change a shipyard workload, some method of compensation, positive or negative as required, should be considered. This is particularly important when work is withdrawn from a shipyard.

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